

Amendments to the Claims

1. (Previously Amended) A process for forming a phosphate conversion coating on a metal substrate surface, said process comprising the following operations:

(I) contacting the metal substrate surface with an aqueous liquid surface conditioning composition that comprises water and the following components:

(I.A) dispersed solid phosphate particles that:

(i) have a diameter no greater than 5 μm ; and

(ii) comprise at least one substance selected from the group consisting of phosphates that contain at least one type of divalent or trivalent metal cations;

and

(I.B) as adhesion-promoting component, at least one selection from the group consisting of the following subgroups:

(1) monosaccharides, polysaccharides, and derivatives thereof;

(2) phosphorus containing solutes selected from the group consisting of orthophosphoric acid, condensed phosphoric acids, and organophosphonic acid compounds;

(3) water-soluble polymers that are homopolymers or copolymers of vinyl acetate and derivatives of these homopolymers and copolymers; and

(4) copolymers and polymers afforded by the polymerization of:

(a) at least one selection from:

-- monomers, exclusive of vinyl acetate, that conform to general chemical formula (I):



where $\text{R}^1 = \text{H}$ or CH_3 and $\text{R}^2 = \text{H}, \text{C}_1$ to C_5 alkyl, or C_1 to C_5 hydroxyalkyl; and

Serial No. 10/049,767

Art Unit: 1762

-- other α, β-unsaturated carboxylic acid monomers; and,
optionally,

(b) not more than 50 % by weight of monomers that are not vinyl acetate
and are not within the description of part (a) immediately above but
are copolymerizable with said monomers that are within the
description of said part (a);

and

(II) contacting the metal substrate surface as conditioned in operation (I) as described
above with a nickel-free phosphate conversion treatment bath that comprises water
and the following amounts of the following components:

- (II.A) from 0.5 to 5 g/l of zinc cations;
- (II.B) from 5 to 30 g/l of phosphate ions; and
- (II.C) a component of conversion accelerator.

2. (Original) A process according to claim 1, wherein the phosphate conversion
treatment bath also contains from 0.1 to 3.0 g/l of at least one type of ions selected from
the group consisting of magnesium ions, cobalt ions, manganese ions, calcium ions,
tungstate ions, and strontium ions.

3. (Original) A process according to claim 2, wherein the concentration of component
(1.A) is from 0.001 to 30 g/l and the concentration of component (1.B) is from 1 to 2,000
ppm.

4. (Original) A process according to claim 1, wherein the concentration of component
(1.A) is from 0.001 to 30 g/l and the concentration of component (1.B) is from 1 to 2,000
ppm.

5. (Previously Added) The process of claim 1 wherein the divalent or trivalent metal
cations are selected from the group consisting of Zn, Fe, Mn, Co, Ca, Mg and Al.

Serial No. 10/049,767

Art Unit: 1762

6. (Previously Added) The process of claim 1 wherein the aqueous liquid surface conditioning composition has a concentration of dispersed solid phosphate particles of from 0.001 to 30 g/l.

7. (Previously Added) The process of claim 1 wherein the aqueous liquid surface conditioning composition has a concentration of adhesion-promoting component of from 1 to 2000 ppm.

8. (Previously Added) The process of claim 1 wherein the aqueous liquid surface conditioning composition is additionally comprised of an alkali metal or ammonium salt selected from the group consisting of orthophosphate salts, metaphosphate salts, orthosilicate salts, metasilicate salts, carbonate salts, bicarbonate salts, nitrate salts, nitrite salts, sulfate salts, borate salts, organic acid salts and mixtures thereof.

9. (Previously Added) The process of claim 1 wherein the nickel-free phosphate conversion treatment bath is additionally comprised of an etchant selected from the group consisting of fluoride ions, complex fluoride ions, and mixtures thereof.

10. (Previously Added) The process of claim 1 wherein the metal substrate is selected from the group consisting of steel sheets, zinc-plated steel sheets, zinc alloy-plated steel sheets, magnesium alloys, and aluminum alloys.